sexes or species with higher loadings are usually more territorial than are those with lower loadings. A sample of 16 male and 5 female woodnymphs from nearby Barro Colorado Island showed no significant loading differences (0.030 and 0.031, respectively, $P > 0.05$), although this difference is little less than that between sexes of some territorially dimorphic species reported by Feinsinger and Chaplin (Am. Nat., op. cit.).

Further observations are needed to show whether the observed behavioral differences are typical of the species and whether there is a real difference in wing disc loading between the sexes.

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**Brown-headed Cowbird parasitism on Eastern Bluebirds.**—Brown-headed Cowbirds (*Molothrus ater*) infrequently lay their eggs in nests of Eastern Bluebirds (*Sialia sialis*). In the most recent compilation (Friedmann et al., Smithson. Contrib. Zool. No. 235, 1977), only 49 records are listed. Musselmann (Bird-Banding 17:60–73, 1946) recorded the highest rate of brood parasitism when, in 1945, he found cowbird eggs in 7 of 268 (2.6%) active bluebird nests in Illinois nest boxes. This note reports on a small population of Eastern Bluebirds that has been subjected to a relatively high rate of cowbird parasitism.

Since spring 1974, from 11 to 14 nest boxes have been maintained for bluebirds on the grounds of the U.S. Geological Survey National Center and adjacent residental areas in Reston, Virginia. The population has increased from 2 pairs in 1974 to 6 pairs in 1976 and 1977. During these 4 years, 6 of 27 (16.2%) bluebird nests with completed clutches were parasitized by cowbirds. Another 3 bluebird nests were almost completely built, but no eggs were laid. Of these, a cowbird laid an egg in 1 nest, giving an overall parasitism rate of 17.5%. Yearly rates were 0% in 1974, 30% in 1975, 16.9% in 1976, and 14.3% in 1977 ($\bar{x} = 15.25$).

Besides bluebirds, Carolina Chickadees (*Parus carolinensis*) nested in the boxes once and Carolina Wrens (*Thryothorus ludovicianus*) nested thrice. One of the wren nests was parasitized, and 2 cowbirds, but no wrens, fledged.

There were 2 periods of cowbird activity—1 in late April to early May and 1 in June—corresponding to the 2 main bluebird nesting periods. Five of the parasitized nests, including the 1 without bluebird eggs, were first nestings, 1 was a second nesting, and 1 in June may have been a first nesting, or possibly a renesting, but this could not be confirmed.

One or 2 ($\bar{x} = 1.43$, $N = 7$) cowbird eggs were laid in each parasitized nest. Judging from nest checks during egg-laying and incubation, the female cowbirds did not remove any bluebird eggs.

Data were sufficient to determine accurately the outcome of 4 parasitized nests. Two of these nests produced no cowbirds—1 because the cowbird laid an egg in an already deserted nest and 1 because the egg was laid 1–3 days before the bluebird eggs hatched. In the other 2 nests, 3 cowbirds but no bluebirds fledged. The cowbird eggs hatched

at least 1–3 days before the bluebird eggs, thus giving a competitive advantage over the young bluebirds, which appeared to die from starvation. In 1 nest, an almost dead nestling bluebird was still present when 2 cowbirds fledged.

In the 3 remaining parasitized nests, cowbird eggs or young were removed for another study; however, it is possible to determine the probable outcome of 2 of these nests based on the embryonic development of an egg when collected compared to the hatching date of the bluebird eggs in 1 and the time interval between hatching of a cowbird egg and the bluebird eggs in the other. In the first case, the cowbird egg would not have hatched. In the other case, a cowbird, but not the bluebirds, would have fledged. Bluebirds fledged from all 3 of these nests after the cowbird eggs or young were removed. In the 2 cases where only cowbirds fledged and in the other case where probably only cowbirds would have fledged, the parasitized bluebird pairs also produced a brood of their own at some other time in the same breeding season.

Of the 3 cowbirds that fledged from these nest boxes, 1 was raised to independence and 2 (from the same nest) were presumably taken by a predator within a day of fledging. Besides these records, from 29 May to 1 June 1974, we saw a female bluebird feeding a fledgling cowbird in the area but saw no young bluebirds. Friedmann (U.S. Natl. Mus. Bull. 233, 1963) reported no records of Eastern Bluebirds rearing Brown-headed Cowbirds.

There are 2 probable reasons for the relatively high rate of cowbird parasitism in this Eastern Bluebird population—nature of the nest boxes and population density of potential hosts. The boxes were made from cardboard, half-gallon cartons (Woodward, Md. Birdlife 29:151–152, 1973), and no effort was made to cut openings to an exact size. As a result, openings of these were considerably larger ($\bar{x} = 5.4$ cm, $N = 25$) than that recommended (3.8 cm [1.5 in.]) by Zeleny (The Bluebird, Indiana Univ. Press, Bloomington, 1976). Thus female cowbirds could easily enter the milk cartons while it would be difficult or impossible for them to enter a smaller opening. This is similar to the situation Musselmann (op. cit.) found in 1945 when all of his 7 parasitized nests were in nest boxes where the roofs had been removed for a time.

These boxes are also quite conspicuous, making them easy to find by cowbirds. The fact that an egg was laid in a deserted nest suggests that at least in some cases female cowbirds find nests without observing adult hosts near the nest. However, this cannot be the only explanation because the same type of box is used at McKee-Beshers Wildlife Management Area, Maryland, about 16 km from Reston. Yet, from 1971 to 1977, none of 120 bluebird nestings in these boxes was parasitized.

Compared to McKee-Beshers, which is on the Potomac River floodplain and has a wide variety of habitats and a high density of breeding birds (pers. obs.), the area where bluebirds nest in Reston is a mostly uniform habitat of upland forest and lawns and has a relatively low density of breeding birds. Of the most recent 52 breeding bird censuses from eastern deciduous forests (reported in American Birds 31:24–93, 1977), only 7 had a lower density than the forest in Reston (see census No. 32). The grounds of the National Center also have a low density of breeding birds, especially of potential hosts (pers. obs.), so cowbirds may have been limited to laying their eggs in bluebird nests, whereas at McKee-Beshers, cowbirds have a much wider choice of hosts.

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